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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/780,384	02/17/2004	Francis Lau	GTI-1519	1625
33058 7590 10/26/2007 MARK E. FEJER GAS TECHNOLOGY INSTITUTE 1700 SOUTH MOUNT PROSPECT ROAD DES PLAINES, IL 60018			EXAMINER MERKLING, MATTHEW J	
			ART UNIT 1797	PAPER NUMBER
			MAIL DATE 10/26/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/780,384

Applicant(s)

LAU ET AL.

Examiner

Matthew J. Merkling

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 October 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-4, 6-16 and 18-29 is/are pending in the application.
- 4a) Of the above claim(s) 24-29 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-16 and 18-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Notice of Informal Patent Application
- ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, 6, 8-11, 12-16, 18 and 20-23 are rejected under 35 U.S.C. 102(b) as being anticipated by Marianowski et al. (US 4,810,485).

Regarding claims 1 and 2, Marianowski discloses an apparatus comprising:

a carbonaceous material reactor vessel (10) having at least one wall (casing, 11) enclosing a reaction space having a reaction zone (31 and 32) containing a solid carbonaceous material (such as coal, col. 2 line 59-65) and having a product gas zone containing reaction product gas (inside tubes 23), said at least one wall forming a carbonaceous material inlet (12), an hydrogen-rich gas outlet (hydrogen, 22), and a retentate gas outlet (product gas, 13); and

at least one permeable hydrogen-selective membrane (metallic foil, col. 3 lines 35-49) disposed within said carbonaceous material reactor vessel reaction space (see Fig. 3) and having a first side in contact with said reaction product gas and an opposite second side in contact with an hydrogen-rich gas.

Regarding claims 3 and 4, Marianowski, as discussed in claim 2 above, further discloses said hydrogen-selective membrane is at least one of proton conductive and electron conductive (metallic foil, see abstract).

Regarding claims 6, 10 and 11, Marianowski, as discussed in claim 2 above, further discloses said permeable hydrogen-selective membrane comprises palladium (col. 3 lines 54-63).

Regarding claim 8, Marianowski, as discussed in claim 2 above, further discloses said at least one permeable hydrogen selective membrane is disposed within a membrane module (multiple tube configuration, see Fig. 3) within said reaction space.

Regarding claim 9, Marianowski, as discussed in claim 8 above, further discloses said at least one permeable hydrogen-selective membrane is in one of a sheet form and a tubular form (foil tubes, see abstract and Fig. 3).

Regarding claim 12, Marianowski, as discussed in claim 8 above, further discloses said membrane module contains a protective sheath (mechanical support, col. 3 line 68 - col. 4 line 5).

Regarding claim 13, Marianowski, as discussed in claim 2 above, further discloses said gasification reactor vessel is a fluidized bed gasification reactor (col. 5 line 66 - col. 6 line 26).

Regarding claim 14, Marianowski, as discussed in claim 1 above, further discloses said carbonaceous material reactor vessel is a gas phase reactor vessel (col. 2 lines 59-65).

Regarding claims 15 and 16, Marianowski, as discussed in claim 14 above, further discloses said hydrogen-selective membrane is at least one of proton conductive and electron conductive (metallic foil, see abstract).

Regarding claims 18 and 22, Marianowski, as discussed in claim 14 above, further discloses said permeable hydrogen-selective membrane comprises a membrane material of a composite of Pd and ceramic (see col. 3 line 54 – col. 4 line 5).

Regarding claim 20, Marianowski, as discussed in claim 14 above, further discloses said at least one permeable hydrogen selective membrane is disposed within a membrane module (multiple tube configuration, see Fig. 3) within said reaction space.

Regarding claim 21, Marianowski, as discussed in claim 20 above, further discloses said at least one permeable hydrogen-selective membrane is in one of a sheet form and a tubular form (foil tubes, see abstract and Fig. 3).

Regarding claim 23, Marianowski, as discussed in claim 22 above, further discloses an electron conductive metal of palladium (col. 3 lines 54-63).

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 7- rejected under 35 U.S.C. 103(a) as being unpatentable over Marianowski et al. (US 4,810,485) in view of Edlund (US 5,139,541).

Regarding claims 7 and 19, Marianowski, as set forth in claims 2 and 18 above, discloses the use of a metallic foil made from palladium in high temperature reaction conditions (col. 2 lines 37-41). However, Marianowski fails to disclose the use of a ceramic material with the claimed formula.

Edlund also discloses a hydrogen-selective membrane that is utilized in hydrogen purification involving hydrogen production under elevated temperatures (greater than 500C, col. 3 lines 20-29).

Edlund teaches that palladium membranes are associated with a prohibitively high cost (col. 1 lines 13-20). Furthermore, Edlund teaches a more economically feasible membrane composition such as palladium coated  $\text{SrCe}_{(1-x)}\text{Yb}_x\text{O}_z$  (col. 2 lines 20-35) that accomplishes the hydrogen separation at a lower cost.

It would have been obvious to one of ordinary skill in the art at the time of the invention to replace the palladium foil of Marianowski with the membrane composition of Edlund to reduce production costs of the apparatus.

### ***Response to Arguments***

6. Applicant's arguments filed 10/03/07 have been fully considered but are moot in view of the new grounds of rejection.

### ***Conclusion***

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Merkling whose telephone number is (571) 272-9813. The examiner can normally be reached on M-F 8:30-4:30.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



MJM



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